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29 August 1956

MEMORANDUM FOR: CHIEF, TSS/PHOTOGRAPHIC SUPPORT DIVISION

SUBJECT : Collapsible Lens Barrels

This memorandum is to confirm the transfer of the subject devices to your office. Attached is a report covering work done on this project. It is requested that an operational evaluation report be submitted by your office to assist us in any future development of items of this type. If any further work is desired on this or other units of similar design, it is requested that a requirement be forwarded to this office before 10 October 1956.

[Redacted]
C/TSS/APD/OB

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APPROVED:

[Redacted]
CHIEF, TSS/APD

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Attachments:

- 1 - Report on Equipment
- 2 - Operating & Servicing Manual

Distribution:

Addressee - Orig. & 1
 TSS/SB - 1
 TSS/APD - 3

TSS/APD [Redacted]

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|------------|----|----------|-------------|-----------|---------|
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~~SECRET~~Report on Equipment Submitted for Operational Evaluation1. Name of Device

Collapsible Lens Barrel

2. APD Project Number, Contractor, and Contract Number

Ad Hoc #38

Contract No. RD-34, Task Order VIII

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3. Classification and Sterility

The device is unclassified. It has been fabricated with no concern to sterility of components.

4. Number of Devices Submitted for Evaluation with this Report

Two

5. Additional Numbers on Hand

None

6. Puture Delivery, if any

None

7. Additional Procurement Plans, if any

None

8. Requirement Source and Date

Memorandum to Chief, TSS/APD from Chief, TSS/PD dated 18 January 1956

9. Pertinent References

Memorandum for Chief, TSS/PD from Chief, TSS/APD/CB dated 21 March 1956
Subject: Request for Two Additional Collapsible Lens Barrels Equipped with Lenses

10. General Purpose of Device

The device is intended to satisfy a requirement for long focal length lens assemblies which are readily portable. Each of the two subject devices has a collapsed length of 15" which extends to 40" and 45" respectively when in use.

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The 40" lens is of unusual speed (f/6.3) and excellent quality. The 48" lens is smaller in diameter but of a slower aperture (f-11) and not of as high a quality as the 40" lens.

12. Known Limitations and Shortcomings

a. Although considerable attention was given to providing an easy reliable method of interlocking the collapsed sections, in the opinion of this office, the devices are somewhat inadequate in this respect. No alternative entirely satisfactory method was uncovered during the construction of these devices.

b. The fine focusing on the devices is not smooth in action and tends to be a little tight. It is anticipated that this difficulty will be worked out in time through normal wear.

c. The iris pin which is to prevent damage to the iris through the closing of the lens sections on a closed iris tends to scrape the inside of the iris ring. This could create particles which would bind up the iris ring at some future time. It is suggested that a rounded or ball bearing headed iris pin be substituted on any future units to obviate this difficulty. Another possible solution would be to use a plastic head on the detent such as nylon which would travel easily against the iris ring.

13. Status of Operating Instruction Manual

Operation of device discussed in supplementary report (attached).

14. Status of Service and Maintenance Manual

Service and maintenance is discussed in an attached report.

15. Status of Specifications and Manufacturing Drawings

A set of engineering drawings and contract specifications are on file in TSS/APD.

16. Report of Technical Tests and Evaluations and Where Available

The subject devices were tested in the basement corridor and outside from the [redacted] The indoor shots were taken on open bulb in a darkened corridor using an electronic flash unit at 200 watt/seconds. Plus-X film was used giving a guide number of 150. The object to image distance was 200 feet for the 40" Astro and 240 feet for the Zeiss 48" Apo-Tessar lens. Results of these tests are as follows:

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| Film # | Opening | Light Distance | Lens | *Resolution Lines/mm | **Corrected Resolution Lines/mm |
|--------|---------|----------------|----------|----------------------|---------------------------------|
| 1 | 11 | 14 | Zeiss | 6 | 15 |
| 2 | 11 | 14 | Zeiss | 11 | 27 |
| 3 | 16 | 9 | Zeiss | -- | -- |
| 4 | 16 | 9 | Zeiss | 13 | 32 |
| 5 | 22 | 6 | Zeiss | 16 | 39 |
| 6 | 22 | 6 | Zeiss | 15 | 37 |
| 7 | | | MIS-FIRE | | |
| 8 | 6.3 | 22 | Astro | 12 | 29 |
| 9 | 6.3 | 22 | Astro | 12 | 29 |
| 10 | 8 | 16 | Astro | 13 | 32 |
| 11 | 8 | 16 | Astro | 13 | 32 |
| 12 | 11 | 13 | Astro | 14 | 34 |
| 13 | 11 | 13 | Astro | 13 | 32 |
| 14 | 16 | 9 | Astro | 14 | 34 |
| 15 | 16 | 9 | Astro | 14 | 34 |

* Average of two persons reading's of resolution test results

** Corrected resolution for the ratio of object to image distance which was different from the prescribed distance ratio of 26 indicated for the NBS charts used.

The outside shots were taken on a sunny, hazy, warm and humid day from just in front of the [redacted]. It was four in the afternoon and the light intensity was estimated between 200 and 400 feet candles. Selected shots are included as attachments. These photographs were all taken on Tri-X film. A Leica camera and housing was utilized in making the shots. Exposure information is referenced on the back of each shot. Attention is called to the grill detail circled in ink in each of the photographs [redacted]

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as an excellent point of comparison between photographs. In the opinion of AFD, the Astro has resulted in superior results to those achieved with the Zeiss lens.

17. Suggested Operational Tests

None

18. Comments are Requested on the Following Specific Features

It is requested that the method of fine focus and your opinion on the relative optical quality of the two systems be commented on in your evaluation report.

19. Project Engineer and Contact in AFD for Additional Information

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20. Report on operational evaluation requested by 10 October 1956.

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~~OPERATION and SERVICING~~

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~~COLLAPSSIBLE LENS BARRELS~~

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**Operation and Servicing
of
Collapsible Lens Barrels**

1. Description of Devices

a. 40" Astro

- (1) Lens Used: Astro
- (2) Focal Length: 40"
- (3) Lens Opening: f/6.3
- (4) Collapsed Length: 15"
- (5) Extended Length: 40"
- (6) Maximum Barrel Diameter: 6"
- (7) Item Weight: 18 Pounds

b. 48" Zeiss

- (1) Lens Used: Zeiss Apc-Tessar
- (2) Focal Length: 48"
- (3) Lens Opening: f-11
- (4) Collapsed Length: 15"
- (5) Extended Length: 48"
- (6) Maximum Lens Diameter: 6"
- (7) Item Weight: 10 Pounds

2. Assembly of Devices - The subject devices are extended for operation using the following steps (see referenced figures).

- a. The lens cap is screwed off of the back of the lens. One lens is shown extended with back lens cap off and the other with the cap on. (Figure 1)
- b. The sections are lifted out of the interior of the main outside housing with the lines etched on the two barrel sections lined up as is indicated in Figure 2. After extending as far

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as possible, the barrel section which is smaller in diameter is rotated counter-clockwise as viewed from the direction of the smaller section. After this operation, the lens is pictured in Figure 3. The other section is extended in a like manner and locked in position.

- c. The extended barrel may then be grasped as illustrated in Figure 4 and placed on a tripod.
- d. The correct camera adaptor, indicated by stamping on each of the adaptor circumferences, is placed on the back of the lens body and the camera assembly desired placed on the lens.
- e. The camera is rough focused by loosening the clamping ring on the third section and pulling its interior section from within until the approximate focus desired is achieved. The right hand of the person in Figure 5 is shown loosening the clamping ring as the left hand extends the contained barrel section to the approximate focus. Turning the clamping ring in a clockwise direction locks the extension section and a counter-clockwise movement unlocks the extension section.
- f. Fine focusing is done by rotating the knurled section at the extreme end of the lens section as is indicated in Figure 6. The right hand of the person in this picture is on the fine focus section.
- g. When the camera is focused the aperture is selected and the picture is taken. With the Zeiss lens, this is done in a conventional manner. With the Astro lens, however, the lens iris ring is locked by a pin in the f/6.3 position. When another aperture is desired, this pin must be depressed by the finger and the iris ring rotated. The purpose of this pin is to insure that the iris won't be damaged by collapsing the lens with the aperture closed down. The lens cannot be collapsed unless the pin is in the out position which is only possible with the iris in the f/6.3 position.
- h. Figures 7, 8, and 9 illustrate various operational shots made of the lens set up. Notice the two tripod set up in Figure 9 which affords greater stability in operation.
- 3. Collapsing of Device - The device is collapsed by reversing the above procedure. Care should be exercised to insure the Astro aperture is in the f/6.3 position, or the barrel sections will not rest down within the outside barrel section. The direction to rotate the lens sections to permit collapsing of the sections is indicated by arrows and the word "off" on each of the lens sections.

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